Abstract Submitted
for the DPP20 Meeting of
The American Physical Society

High power electron beam for plasma heating ANTON TKACHEV, SERGEY KOREPANOV, IVAN ISAKOV, LEE TAGNEY, KURT KNAPP, ANDREY KOREPANOV, KONSTANTIN PIROGOV, VASILY MATVIENKO, IVAN KARNAVSKIY, TAE Technologies — A high power electron beam for plasma heating has been developed at TAE Technologies. The electron beam is designed to achieve up to 200 A electron current at 30 kV accelerating voltage with pulse duration up to 6 ms. Electrons are extracted from a plasma emitter and accelerated by multi-aperture accelerating grids. The beam is transported to the injection port through a grounded drift tube. The plasma emitter of electrons is immersed in an external axial magnetic field to provide conditions for axial injection through the magnetic plug into the confinement volume of the C2W. The combination of high beam current, relatively low accelerating voltage, and long pulse duration result in extremely high beam perveance with additional measures taken to mitigate the space charge effects that otherwise dominate the behavior of the beam in the drift space. One way to reduce unwanted space-charge effects is to produce an annular-shaped hollow beam. Another way to neutralize space charge of the beam is to control gas conditions inside the drift space such that the beam ionizes residual ambient gas, and the ions are captured into the potential well created by the electron beam. In this poster, is reported the design and the physics of the electron beam. Are shared the estimations of beam transport into the plasma. Are discussed some preliminary considerations regarding the beam-plasma interactions.

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Date submitted: 01 Jul 2020 Electronic form version 1.4